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ABSTRACT

A college statistics class for limited-English-speaking Hispanic students and students with disabilities incorporates principles of problem-based learning. Sessions start with brainstorming in which real-life problems are presented to raise issues, encourage participation, and generate enthusiasm. Using negotiation, the issues generated in the brainstorming session are trimmed to clearly definable learning tasks representing essential ideas and linkages. Next, groups of three to five students are formed and designate one member each as an "ambassador" to other groups to obtain and communicate required information. This designation changes with each problem and ensures that by the end of the course, the students have interacted with many different classmates. Reports are due 2 weeks after distribution of the problem. In the intervening week, a session is held to discuss any issues that require clarification. Presentations by each group occur at a culminating session. The groups are responsible for demonstrating how their smaller problem interrelates into a larger research problem as initially represented. Each student grades the presentations and includes comments, based on a scoring rubric. Their marks and the teacher's are averaged into a group mark that is allotted to each group member, and comments are distributed to each student. Each group submits a written statistical analysis of the smaller problems. Questionnaires returned by 130 students indicate that students regard problem-based learning as more challenging, worthwhile, and meaningful than traditional instruction. Two sample problems are presented. (TD)

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ED 477 414

INCORPORATING A PROBLEM-BASED LEARNING ENVIRONMENT FOR HISPANIC LEARNERS AND STUDENTS WITH DISABILITIES IN UNIVARIATE STATISTICS

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RC 024092

Incorporating a Problem-Based Learning Environment for Hispanic Learners and Students with Disabilities in Univariate Statistics

Abstract

Seeing a steady increase in Hispanic learners and students with disabilities populations, our colleges and schools of education have to change content and pedagogical approaches to accommodate these new educators, counselors, and administrators. We have taught writing, speaking and listening for many years and now find the emphasis on critical thinking poses challenges for these unique populations. With this nexus of events, we need to incorporate the problem-based learning perspective into our courses. Consequently, I have designed a problem-based structure for the educational statistics courses I teach. The environment allows the special needs of Hispanic and persons with disabilities populations to improve communication abilities in cross-cultural work groups while assisting all learners in being more efficacious in their future research and statistical endeavors.

The increased demand from all levels of our educational system for graduates who are skilled in problem solving and all forms of communication coincides with schools and colleges of education seeing a steady increase in Hispanic learners and students with disabilities populations. This growth will continue as efforts are implemented to increase the number of credentialed

teachers, counselors, and administrations. A desired outcome of this growth is increasing community and global awareness among our students which can only be achieved if Hispanics and students with disabilities are successfully mainstreamed into the teacher and graduate education community.

With these perceptions as my premise, this paper is directed at schools and colleges of education as well as elementary and secondary schools. In an effort to design a college statistics course that might better meet the needs of the future teachers, counselors, and administrators who take it. I restructured a traditional lecture/laboratory educational statistics course into one focused on problem-based learning.

Problem-Based Learning

Problem-based learning, or PBL, has been recognized as an important educational strategy (Cordeiro, 1998) and has been adopted in numerous medical and nursing schools (Harden & Davis, 1998). Arambula-Greenfield (1996) states PBL "is an instructional format requiring students to participate actively in their own learning by researching and working through a series of real-life problems to arrive at a 'best' solution" (p. 26). Irregardless

of the field of application, Bridges and Hallinger (1997) present the following characteristics of PBL:

1. Problems that future professionals predictably will encounter in the world of practice serve as the stimulus for acquiring new knowledge.
2. The content of the curriculum is organized around these problems rather than around the disciplines.
3. Students work in small groups and take responsibility for their own learning.
4. The instructor creates or selects the problems that are the focal point for learning but does not take an active role in presenting the content.

The definition of a problem is one "for which an individual lacks a ready response" (Bridges, 1992, p.5) and is "ill-structured and complex…that may even 'change course'" (Arambula-Greenfield, 1996, p. 26). A key component of PBL is the nature of the problems. Problems come in two forms: high ground and swampy (Leithwood, Begley, & Cousins, 1994). High ground problems are more technically natured with well-rehearsed procedures available. Swampy problems are those situations which are complex to the person solving them and whose procedures and solutions are often disagreed upon by the experts. Given the continuum of constituents and needs with which educators are

faced, it is critical that the preparation of future educators focus on solving swampy, ill-structured problems.

Why use PBL?

The use of PBL has continued to increase since the 1950s. The instructional strategy is now included in various disciplines from elementary grades through post graduate school. Bridge (1992, p.15) summarizes some claims by advocates of problem-based learning which counter the more traditional and conventional instructional methods:

1. PBL allows students to develop "substantially more positive" attitudes toward the learning environment.
2. Students are found to study more for meaning and not for reproducing instructor-proffered answers.
3. PBL students complete instructional programs quicker and with lower attrition rates than students in traditional learning environments.
4. Negligible differences in students' basic knowledge of disciplines "favored traditional programs, but PBL students show steeper growth during period of study."

These results are based upon increased student motivation, the collaborative teamwork used to structure solutions, the coaching or tutoring conducted by the instructor and the inherent benefits of using real-world problems. Facilitating cognitive

development and academic achievement, Bridges (1992) explains that PBL's processes utilize activation of prior knowledge; similarity of context for learned and applied information; and opportunity to elaborate information. Knowledge elaboration occurs by team discussion, teaching peers what has been learned, and debating how the acquired information should be applied to the problem's solution.

The context of a real-world problem allows the students to acquire knowledge in a functional context. This parameter implies that the problems closely resemble the problems encountered later in professional careers. The functional context supplies the motivational appeal, a key feature of PBL. It is also the functional context that increases problem solving ability and teamwork.

Special Needs of Hispanic Learners and Students with Disabilities

Hispanic learners and students identified disabled as specified in the Americans with Disabilities Act of 1990 (Public Law 101-476; IDEA) pose special problems with respect to using the problem-based approach (Allen & Rooney, 1998). One of two major concerns is that the students often group together determined

by enrollment patterns or actively seek each other in group assignments. Secondly, their backgrounds based either on culture/ethnicity or previous educational environments typically involve prescriptive educational models that match their preference for order, hierarchy, classification, segmentation, and quantitative dissemination of material (e.g., the typical *stand-and-deliver* lecture).

Among the Hispanic population, English as a second language is a common factor for many of the current education students. Problem-based learning utilizes high-context communication patterns which are the pivotal contextual features of the group dynamic. These communication patterns are important and more subtle. For the ESL learner, their communication styles can reflect the paradoxical nature of the training in collectivist cultures with educational systems reflecting autocratic instruction.

The students with disabilities are often plagued by difficulty in transferring information learned in one setting to another situation or environment (Lerner, 1993). This transfer problem becomes critical when students acquire skills under the tutelage of the resource educator and then are expected to generalize and maintain those skills in the regular classroom

setting. This process is indicative of even transferring to real life situations, the theoretical basis of problem-based learning and common in high-context cultures. Steps towards a solution will benefit mainstreamed students, particularly when emphasis is placed on functional skills that are both currently relevant and important to successful adulthood.

Group processes function most smoothly when the members intuitively respond to nonverbal behaviors in the ways common in high-context cultures. With these two divergent student populations of this paper, the role of the instructor needed to remain firmly grounded in PBL. The instructor serves as a facilitator working to guide, motivate, and probe the students' reasoning process as they journey with the problems rather than directing the learning. By following these tenets, the students then begin to become more comfortable with a less autocratic classroom environment.

Incorporating PBL Into the Curriculum

For my course, I chose to incorporate the PBL instructional approach into an existing educational statistics course. The danger for this starting point for creating the PBL materials is the subject

matter not the problems. For when an instructor begins with the subject matter, the problem and the product may not be authentic ones because the instructor has created problems and products that lend themselves to application of content (Bridges & Hallinger, 1997). The resulting contrived problems, products, or both result in the instructor undermining a basic tenet of PBL which is that learning in a context that resembles the one in which the knowledge and skills will later be used. Another limitation of incorporating PBL into a course is that the instructor may present the subject matter first on the basis that students need to know it before working on a problem. When the subject matter is presented first, and students proceed to apply this newly acquired knowledge to a problem, the students' ability to transfer the knowledge may be compromised (Norman & Schmidt, 1992). These limitations to the incorporation were overcome by the instructor making concerted efforts to avoid them.

Another issue that arises with ad hoc implementation of PBL as part of the course is that students may lack a basic understanding of PBL and the skills required in this radically different learning environment (Bridges & Hallinger, 1997). The fundamental skills needed to function effectively in a PBL

classroom are conducting meetings, building group consensus, dealing with conflict, and engaging in group problem solving. These prerequisite skills are utilized by effective educators, leaders and problem solvers in real life.

The advantages of using PBL as part of a course outweigh the presented limitations. The approach requires less effort than designing an entire course around PBL. Instructors may use PBL without seeking the prior approval of one's colleagues. Students may respond even more positively to PBL because it represents a change in pace and a more active role for them in the learning process than the more didactic forms of instruction.

The instructor needs to recall the primary elements of problem-based learning. "These are the provision of problem-based situations as starting points for inquiry, the framing of learning tasks to guide and search, synthesis, and integration of information by the students, and the subsequent sharing of that information with the group" (Rangachari, 1996, p. 64). These five components listed constitute the process objectives for all problem-based courses and for my course.

The Problems

The content of the course in educational statistics that I teach is guided by the University catalogue description and the consensus of the Research Methods faculty in my academic department (examples shown in Exhibits 1.1 and 1.2). The first problem explores the univariate statistics domain through the perspective of a guidance counselor. To generate the discussion, I wrote the problem in the form of research notes (Exhibit 1.1). The format was readily apparent since most of the students in my classes intend to pursue graduate level degrees in either Counseling or Education Administration.

The second example (Exhibit 1.2) is written as an excerpt from a meeting's minutes. This problem was designed to stimulate discussion of the role of the affective domain in learning and was based upon a general lack of consideration for this domain when curriculum is debated at the district level. It stemmed from an expressed desire to demonstrate to the students that issues can be generated from any written material.

The Process in Practice

This section describes the overall structure of a typical session.

Brainstorming. The usual process for PBL, when in small groups, I use paper problems to raise issues, encourage participation, and generate enthusiasm. However, the educational statistics classes are on the large size making me take a more active role by circulating the room to ensure that the various groups have at least one member acting as a scribe. In some instances, usually early on in the semester, I have been known to act as scribe at the blackboard.

Definition of Learning Tasks. Using negotiation, the issues generated in the brainstorming session are trimmed to clearly definable learning tasks representing the essential ideas and linkages. Generally, this task is focusing on only one or two of the broadly presented research questions (see examples). This phase resembles the smaller group format but the larger class size demands great vigilance by the students and the instructor to ensure that key issues are not missed. The negotiated learning tasks are not sacrosanct since when the class disbands into their smaller groups the tasks are usually modified to the uniquenesses of the

smaller groups. In this portion of the PBL process, I have noted that not all students participate to the same extent on all occasions but over the course of the semester, the participation evens out.

Formation of Study Groups. In this phase, the learning tasks focus on the formation of groups consisting of three to five students. I have found that for my students there is little variability or floating groups since a majority of my students are considered commuters from nearby smaller towns and are also constrained by a variety of work schedules. I have found that by the mid-point of the semester if I attempt to float different groups then these issues create more tension and strain than the principle is worth and instead I monitor that students are not ending up with the same type of task or job on the specific problem. In the groups, each student opts to be part of a single study group for the specific problem. Considerable negotiation occurs at this stage since some tasks attract more students than others causing shifting within the groups themselves. I have noticed on occasion that a quick discussion leads to the merger of the essence of a task with another one when some students realize the interrelatedness of questions and ideas for specific problems. Usually, groups designate one member as sort of an ambassador-at-large to other groups to obtain

and communicate the required information. The designation changes with each specific problem and ensures that by the end of course the students have interacted with many different classmates. It is clear that these group dynamics differ from the conventional small group format yet retain one key element of remaining intact for an extended period of time.

Preparation of Statistical Reports. The students meet in the class only once a week and need time to prepare their reports to be formally evaluated. In general, reports are due two weeks after the distribution of the problem. This gives the students sufficient time to meet, discuss, find and evaluate the information, write their analyses, and on a rare occasion prepare for their presentations (usually only once for each group). On the intervening week, I hold a session to discuss any issues that require clarification. On these weeks, I have noticed students sharing acquired information and data interpretation with one another demonstrating a more collegial atmosphere than a competitive environment.

Group Presentations. Presentations by each group occur at a culminating session which is usually the last officially scheduled lecture time-slot. The objectives of this component are to teach students to effectively communicate the information that they have

gathered and to provide a mechanism for clear expression of ideas by individual members. Here again the format diverges from the conventional format, in that, the groups are responsible to demonstrate how their smaller problem interrelates into a larger research problem as initially represented (see examples). Furthermore, while usually there is no formal presentation of information in the small group setting, in the culminating session, one student is designated to chair the proceedings and ensure that the presentations keep to time allotted.

Group Evaluations. Evaluations provide a mechanism for class members to express their individual opinions about the presentations made by each group. Each student is asked to grade the presentations and include comments. They are assisted by guidelines provided by me in a scoring rubric. The instructions indicate that they should give high marks for clear statements of objectives; clear and concise presentations; logical sequencing of individual sections; concepts supported by good examples; enjoyable format; precise answers to questions; and provision of new and useful information. Conversely, they are to give low marks for rambling, discursive presentations; poor statements of objectives; poor coordination between individual sections; tedious,

dull, and overlong presentations; inadequate referencing; and inability to answer questions satisfactorily.

This portion of PBL is subjective even with the guidelines. Students often feel uncomfortable with the process. In any case, I emphasize that responsible learning involves coming to terms with subjectivity. Their marks (along with mine) are averaged to achieve a group mark that is allotted to each member of the group. Along with the marks, I distribute a typed sheet of the collated comments. This step is another departure from the small group format but allows for the students to experience formal presentations that many will have to face in their jobs.

Written Statistical Analyses. Each group is required to submit a written statistical analyses of the smaller problems. The instructions are that the background and research questions be clearly stated. The analysis of results be correctly used and interpreted for the problem and research questions with the inclusion of appropriate tables, equations, and/or figures. The development of the discussion must be logical, supported by the results, and answer the general research question with its specific research questions. I grade and comment on these reports on my

own and use a scoring rubric developed to address the identified criteria.

Student Comments

Currently, I have only collected 130 completed qualitative responses to seven open-ended questions for the past three semesters (N = 161 who completed the course with 56 in Fall 2000, 54 in Spring 2001, and 51 in Fall 2001). These questions are to aid the student in reflecting on self-perceived changes and provide insights about the effectiveness of PBL within the learning environment. The organization of the responses are by themes. The statements are exactly transcribed as written by the students.

What did you like about problem-based learning? Three general areas appeared in students' comments for this question.

Value of structure. Students appreciated how PBL assisted in maintaining organization and allowed for open communication and participation by group members. For example:

> PBL maintained a specific order; everyone was able to get their point written down.
>
> PBL forced us to write things down. Keeping a record of brainstorming helps keep issues from been forgotten. It gives everyone's ideas equal weight. I liked that when used correctly the group is forced to

> move forward and discussion of irrelevant topics is avoided.
>
> PBL presented a way to organize ideas from people with various perspectives on the problem. Since PBL is methodical, once our group became used to the process, our ideas just flowed.
>
> The structured format was easy to follow after the first time.

Improved task completion. Students commented on how PBL improved task completion and group interaction compared to past group experiences. Comments expressing this point were:

> PBL made us communicate with our group instead of keeping our ideas to ourselves.
>
> I like the entire concept of PBL. Learning to work together to complete the task with other people as a group and not in a group where you have a leader and then a group.
>
> For once, I enjoyed learning. PBL is based on work in a group effectively to finish a task. I feel this will be my most valuable graduate learning experience. It will transfer well to the 'real world' job environment. It also assisted me with insight into how others think and feel about the issues of counseling strategies.

Improved problem solving. The following comments demonstrated that the students appeared to appreciate the value of PBL in solving problems.

> I enjoyed the fact that PBL was used for learning about statistical application. It made the class not just another memory class, but grouped us with our peers to develop and utilize our critical thinking. I learned more about the applications of statistical

analysis to administrative problems that I was able to assist peers at my school site.

PBL is an excellent problem solving technique.

I liked how the PBL method provoked interest and further discussion on the subject. I liked how the process was a group effort and the research-analysis process helped me to learn statistics.

What did you dislike about problem-based learning?

Responses to this question created three themes.

- Difficulty with a new learning behavior.

  The problem I had with PBL was it was a shock to the system…I was responsible to learn.

  I can't say I didn't like the PBL method. PBL alone helped our group when it was followed. It is not for the undisciplined.

  Change is stressful enough and on top of it involved statistics. What stressors for my life.

- Time consuming.

  It is time-consuming in the beginning. People who are dominant were not able to and got frustrated which resulted in conflict.

  The process was slow and limited natural leaders of which this class appeared to have several budding administrators. It was a good learning process for them since they had to learn to be more subtle.

  The process demanded more time than I am used to. It demanded of us to meet outside of class to analyze the results of our statistics. This is limiting to those of us who do not live locally.

- Lack of commitment to group.

> The one thing I did not like about PBL is the fact of relying on others for the work to be done. When one person slips up then the group messes up.
>
> A major drawback to PBL process was if there is a slacker or group members missing meetings. Your task gets larger and more tedious. This is frustrating and slows the overall process of problem solving.

I didn't like that my group suffered from a slacker who rarely showed up to group meetings and complained about how it was taking time away from home life. In the beginning it caused us who worried about a good grade to work harder. We solved the problem by requesting a group conference with the instructor. The solution was remove the group member which allowed those who remained to enjoy using PBL. We do not know how the ex-member felt but we were now all committed equally to our learning of statistics.

After experiencing problem-based learning, would you like to have other courses use this method, or would you prefer a more traditional lecture approach? Explain. The basic students' responses to these questions were positive for the use of PBL in the statistics class. A majority of the students stated that they were tired of the standard lectures and preferred the group approach because of its engaging style. It should be noted that these

comments were tempered with the opinion that the approach is dependent upon the course.

> For me, I prefer the PBL approach and find the traditional lecture more impersonal. PBL lets the individual voice their opinion. They are on an equal status with group members where in the lectures the professor has all of the control.
>
> I might take another course with PBL to improve my skills to help me in my future job as an administrator. But, I feel I gain more broad-based knowledge in the traditional lecture. Reflecting, I guess it would depend on the subject and see more application for psychology courses and counselors.
>
> I wouldn't mind more classes using PBL but I am afraid I prefer the usual stand-and-deliver. Lectures are boring but they are what I am used to and I have a system to taking notes, memorizing the text and getting the high grade.
>
> I want more PBL classes since I learn and actually retain this statistics information much better. And I have never been successful in a math class before! One key fact has been the interaction with the instructor but I can say that the interaction with the students is what also helped. More personalized than the stuffy old lectures. By interacting with other students, a person may not ever be able to interact in the real world. This is critical for us, new administrators. I personally have made friends with my group members.. It's nice then you actually aren't letting yourself down if you don't do the work but your actions are affecting a friend.

Having used problem-based learning in this class, if you were to use problem-based learning in a future class, what would you want to do differently? In the comments, many students

wanted PBL in all graduate classes while others remained more conservative in their approach to applying the method. Some urged the consideration of having PBL and other teaching methods complement each other.

> I think the lecture is necessary and PBL should not be the only form of how to learn in a course.
>
> I prefer the traditional approach and recommend that in the future you focus on that and supplement with PBL.
>
> This is a dilemma question. PBL lets you express yourself and you thoroughly learn about one particular education problem and how to utilize statistics to support your arguments. However, the applications are confined to one topic excluding other educational or counseling issues. The process takes so long that some people in this class can still only see how to apply statistical analysis to administration/curriculum issues and not how to apply to other real life situations of counseling methods or teaching methods.

Did you gain anything personally from the problem-based learning approach? Explain. The students' written responses to this question had the students singling out specific skills or competencies in the following areas (number in parenthesis indicates the percentage of students who made specific mention of that particular skill or competency): communication (40%), ability to work with others (35%) organization (25%), leadership (20%);

utilizing statistic analysis in educational research (18%), self-confidence (18%) and problem-solving (15%).

How effective was this method of instruction (problem-based learning) in enhancing your knowledge of univariate statistics and educational-related issues? Responses were as follows: generally effective (34.8%), effective for the specific group topics (39.8), neither effective nor ineffective (10.6), not effective (14.9%)

How successful was your group, and what factors contributed to the success level of your group? In their perceptions of their ability to work as a group, students responded as follows: very successful (39.8%), highly successful (3.1%), successful (29.8%), pretty successful (9.9%), generally successful (11.8%), and fairly successful (5.6%). For several students, they stated that the level of success by their group was the opportunity for everyone to contribute and participate. Many responses mentioned the ability to work together and cooperating with group members. Another aspect of some comments was that the more the students used PBL in the specific problems the more successful their became. The general tone was that the process helped them work together and contribute and participate. Other students attribute

their group's success to utilizing individual and collective abilities to research and utilize the statistical analyses to solve their problems.

Conclusions

Problem-based learning proved to be a viable teaching approach in an educational statistics class. The described course set out to adopt and incorporate principle elements of problem-based learning. As detailed here in this paper, the typical session retained similarities of small groups while also modifications to adopt to large groups. The brainstorming finds the instructor in a more active role. Group negotiations result in explicit learning tasks being assigned. The groups rarely float. The formal presentations and group evaluations are significant departures from the traditional format. However, the problem-based learning process is retained forging meaningful links among theory, research, and practice through using problems that students will encounter as teachers, counselors, and administrators.

To state with certainty that problem-based learning improves statistical analysis skills by producing outcomes that match the claim requires empirical evidence that was not collected

at this time. For interested instructors, implications of this approach are that students will exhibit high levels of satisfaction. The students will regard their preparation as more challenging, worthwhile and meaningful than with traditional instruction. Participation in such a class will amply reward the students and the instructor since it reinforces the basic tenet that higher education is a privilege with the attached price of responsibility.

References

Allen, R, & Rooney, P. (1998). Designing a problem-based learning environment for ESL students in business communication. *Business Communication Quarterly*, *61*(2), 48-56.

Arambula-Greenfiled, T. (1996). Implementing problem-based learning in a college science class. *Journal of College Science Teaching*, *26*(1), 26-30.

Bridges, E. M. (1992). *Problem-based learning for administrators* (ERIC Document Reproduction Service No. EA 023 722).

Bridges, E.M., & Hallinger, P. (1997). Using problem-based learning to prepare educational leaders. *Peabody Journal of Education*, *72*(2), 131-146.

Cordeiro, P.A. (1998). Problem based learning in educational administration: Enhancing learning transfer. *Journal of School Leadership*, *8*(3), 280-302.

Harden, R.M., & Davis, M.H. (1998). The continuum of problem-based learning. *Medical Teacher*, *20*(4), 317-322.

Leithwood, K., Begley, P.T., & Cousins, J.P. (1994). *Developing expert leadership for future school*. Washington, DC: The Falmer Press.

Lerner, J. (1993). *Learning disabilities: Theories, diagnosis, and teaching strategies* (6th ed.). Boston: Houghton Mifflin.

Norman, G.R., & Schmidt, H.G. (1992). The psychological basis of problem-based learning a review of the evidence. *Academic Medicine*, *67*(4), 557-564.

Rangachari, P. K. (1996). Twenty-up: Problem-based learning with a large group. *New Directions for Teaching and Learning*, (69), 63-71.

Exhibit 1.1. **Sample Problem: Research Notes of a Guidance Counselor**

The following research notes are from a guidance counselor at a fictitious community college located in the United States.

Research Notes on General Happiness
compiled by S. O. Lo

Based upon grant money from the VIP Corporation, I was able to conduct a survey of 1,517 persons. This survey was designed to explore the question of 'What is the state of my general happiness with life?' and its' related questions of 'Is my life exciting or dull?'; 'Do I willingly obey others?'; "Do I think myself to be popular or well-liked?'; 'Am I able to think for myself?'; and 'Do I willingly help others?' The basic premise for my research is that all of these factors lead to a person's sense of well-being and general happiness in one's life when they are actively engaged in these activities. Furthermore, my research premise is that depending upon the region of the United States (northeast, southeast, or west) and which race (white, black, or other) will determine your answers to these basic perceptions. Note: I saved the questionnaire data as CP04z.

Proposed General Research Questions:

What is the basic composition of my population by gender, by race, by region, and combinations of categoricals?

What do the dispersion results indicate about my population?

Which variables demonstrate relationships and how does this impact my research premise of the interrelatedness for the construct of general happiness?

What are the similarities and differences between men and women on the variables?

What are the similarities and differences between the races on the variables?

What are the similarities and differences between the regions of the US on the variables?

Do interactions occur between the various grouping variables on any of the listed constructs?

Test my proposed hypothetical model: {Remembering to consider computer models, too}

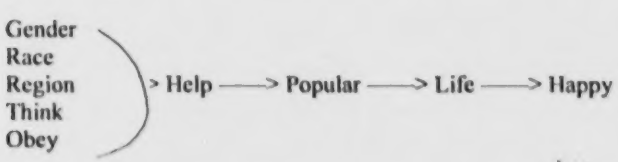


Exhibit 1.2. **Sample Problem: Excerpted Minutes of a Curriculum Committee Meeting**

The following excerpted minutes of a committee meeting are fictitious. The committee's mission is to monitor curriculum in a moderately large school district (10 high schools, 20 middle schools, 60 elementary schools, 4 primary schools, and 3 adult education sites). The school district is located in a state in the United States. The community is located in a unique situation that has a moderately large urban center surrounded by agriculture. The school district contains multiple ethnic groups and has a large portion of the student population with English as the second language. The school district community college located in the United States

Excerpted Minutes of the District-wide Curriculum Committee
Date: March 15, 2000

Chair: Dr. Siegel; Members: Dr. Gordon, District 1; Mrs. Petoyian, District 2; Mr. Dao, District 3; Mrs. Taylor-Diaz, Board Member; Mr. Hernandez, Parent Representative. Absent: Dr. Kerr, Superintendent.

Old Business, Point 5: Dr. Siegel summarized that the committee has been debating the appropriate research strategy for assessing the effectiveness of the District's curriculum in fostering students' affective domain development. The committee has agreed on the following process:

- Seventy-five District high school seniors, randomly selected from the district's 10 high schools, will participate in a survey of the affective domain focusing on the variables of self-regulated learning (SRL), self-worth, self-concept, and self-efficacy. Other variables to be measured are gender, ethnicity, level of education hoped to attain (high school diploma, BA, MA/PhD), proposed occupation (trade, business, professional), and current number of hours of study per week. Created data file will be known as Proj01b.

- The measures used have been developed and pilot tested by Drs. W. Johnston, J. Eagle, and J. Ruiz from the College of Education, State University at Heness Ridge. They intend to answer the following broadly-based research questions:

  What is the basic composition of the population by gender, by ethnicity, by education level hoped to attain, and by proposed occupation?

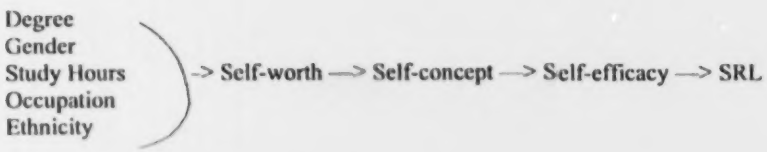
  What do the dispersion results indicate about the population?

  Which variables demonstrate relationships and how does this impact my research premise of the interrelatedness for the construct of self-regulated learning?

  What are the similarities and differences between men and women on the variables? between the ethnic groups on the variables? between the proposed occupations on the variables? between the proposed level of education attainment on the variables?

Do interactions occur between the various grouping variables on any of the listed constructs?

Test the proposed hypothetical model: {Consider computer models as well}



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